Synthesis of Project Management Processes in Information Technology Migration Projects

Abstract: A close look at Project Management Processes in Information Technology Migration Projects is essential considering that modernization is part and parcel of Software Lifecycle. The task could be daunting due to lack of data and unified approach. For large IT (Information Technology) migration projects, it is difficult to tailor a project management process. Achieving Client acceptance, economy in project planned parameters, and value of developed Software are of prime importance. Majorly migration and modernization is confined to re-doing new systems and retiring the existing software systems. This paper examines two large legacy system migrations into modern SOA (Service Oriented Architecture) Platform from the perspective of project management challenges/practices through evaluation of process synthesis. The stated work also suggests the factors that may be crucial for future migrations and other types of modernizations while inviting such trends in similar or other types of modernizations.

Keywords: Information Technology Software Migration; Project Management Process Synthesis; Process Tools and Techniques

INTRODUCTION

Successful Performance leading to customer delight, although assured, is only possible through proper application and quantifiable control of project management processes. The challenges in projects are always different owing to their uniqueness, however; a pattern emerges which contributes to organization expertise and general trend for industry wide advantage when two large legacy migration projects such as the ones quantifiably reviewed here collectively synthesized. It is unknown:

- what processes are useful,
- how much to put to use,
- how much of the process experience is re-useable,
- what process variations/tailoring may be necessary, and
- how the projects can be compared and contracted in process application choices

There is also a need to clear out unfounded fears of utilizing the existing legacy systems as input for modernization when migrating to new technology due to outweighing advantages derivable by adhering to a successful process application. The process synthesis can act as a fundamental framework for future migrations. The above mentioned problems have been studied through data from a survey/ study conducted on the Project Management Processes synthesis as applied to Information Technology Software Migration Projects.

Both the projects considered were successful migrations carried out by SoftSol for two reputed US based companies in Entertainment and Bio-Medical Research Industry. The processes adapted, executed, and effectiveness derived has been quantitatively outlined. Experience derived from managing IT (Information Technology) Software migration as detailed here is worth a look due to the enormous value addition they bring to the standard management practices. Migration projects of similar technological upgrade render themselves to identifying parameters which factor-in and that make them unique in the process adaption and the process tailoring. The projects under consideration have differed in many areas such as the target technology, the amount of customization and the interfaces with external resources.

SoftSol and Information Technology Software Migration

SoftSol is a small successful Information Technology Company with Global presence and main offices in USA and India. SoftSol specializes in tool based auto migration of legacy systems into Software platform of customer choice. SoftSol successfully delivered a few migration projects both to US Government and Private Organizations. This article presents the data from two of large Legacy migrations that SoftSol had successfully completed for two major US clients.

SoftSol's other solutions include Conversion tools development, product development, software testing solutions, and software services in latest Information Technology Software Solutions. The Migration Approach is to use the legacy system code as input for the conversion tool which outputs target platform framework and code with line-by-line translation as per desired and chosen options. The Conversion tool supports several of the latest target platform design choices. Manual refactoring will be performed in two areas to resolve deviations. Type-I Issues are Cross Platform deviations resolved through centralized fixes in the framework which will have impact on entire code base. Type-II deviations are target platform specific and defects of this nature are resolved in the specific scenario/module.

Contemporary Literature Survey

This paper is mainly organized to align with PMBOK project management processes. A few of the contemporary works have been surveyed and outlined below to show how and why project management is a challenge for IT migration projects alike some of the other areas the papers detailed.

Reference No.1 : Vittorio Chiesa, Federico Frattini, Valentina Lazzarotti, Raffaella Manzini(2007). Measuring Performance in New Product Development Projects: A Case Study in the Aerospace Industry
The paper presented a case study for designing and developing a performance measurement System using practices which are widely accepted. It Demonstrated the key importance of the following in the developed framework (i) Clear communication of Objectives (ii) Allow tolerable Incoherence between Design and Implementation rather than hard imposition (iii) Implementation should grow from simple to complex (iv) Easy accessibility to project information (v) Obtain strong backing from Top Management to effect reducing fears around measurements (vi) Educating Measurement Context (vii) Continuous Improvement through application, measurement, and refinement
Reference No.2 : Dirk Pons(2008). Project Management for New Product Development Project Management Journal
The Paper presented gaps in Project Management Practices as applicable for New Product Development (NPD) (i) How Project Management approach differs for NPD where the scope of work cannot be precise at one time (ii) Challenges around 9 Knowledge areas and phases of PMBOK in case of NPD projects where quantitative definitions are less viable and relative measures alter with time (iii) human resource contributions and challenges the NPD teams face
Reference No.3 : Stephen M. Swartz (2008). Managerial Perceptions of Project Stability
The paper analyzes a typical project health and defines "stability" measure/metric as a derivative (increase or decrease) of deviations to the project planned parameters. Relative importance of project execution measurement parameters have been ranked from the perspective of considered

population of managers. Emphasized the importance of standard measures/metrics and Earned Value analysis.
Reference No.4 : Helgi Thor Ingason, Haukur Ingi Jónasson (2009). Contemporary Knowledge and Skill Requirements in Project Management
The paper analyzed contemporary knowledge and skills in Project Management. Stresses a need for dynamic manage tools to act as "Eye of Competence" (Behavioral, Contextual, Technical). Recommended that the traditional baseline used to describe the discipline of project management could be improved. Presented results from (i) Project Management Survey with three dominant categories – (i) interpersonal (ii) strategic alignment (iii) project planning & control, and least popular - finalization. Project Management Book Survey with strongest emphasis on (i) project planning and control (ii) relationship management (iii) resource management. There is little focus on program management, marketing, and legal issues. Out of 18 different categories surveyed areas of strong focus (i) interpersonal (ii) relationship management (iii) resource management (iv)project planning and control, (v) strategic alignment, and areas of less focus (i)marketing (ii) legal issues (iii) finalization (iv) program management
Reference No. 5 : Steven R. Meier (2009) . Causal Inferences on the Cost Overruns and Schedule Delays of Large-Scale U.S. Federal Defense and Intelligence Acquisition Programs
The paper presented a Causal Analysis for deviations in project planned parameters of cost and schedule in large scale U.S. Federal Defense and Intelligence Acquisition Programs. Recommends that acquisition community involved in acquisitions must act to correct Inefficient Policies and practices that have been identified. Root Cause traced the problems in areas of (i) hiring and placements - inexperience and lack of knowledge (ii) Stakeholder involvement (iii) organizational consolidation (iv)over reliance on contractors (v) short duration program manager rotation, lack of succession planning and mentoring
Reference No. 6 : Paolo Landoni, Benedetta Corti (2011). The Management of International Development Projects: Moving Toward a Standard Approach or Differentiation?
In this paper, the history of project management systems pertaining to International development projects has been given. Identifies six progressive phases - identification, preparation, appraisal, negotiation, implementation and supervision, and evaluation. 5 different Government's standards analyzed in 4-dimensions of (i) Project Cycle (ii) Logical Framework (iii) Organization and participation Aspects (iv) Tools and Techniques of Project Management. Process Summary and Performance Measurement Framework has been outlined. Recommends further research in order to promote development cooperation.
Reference No. 7 : Karel de Bakker, Albert Boonstra, Hans Wortmann (2011). Risk Management Affecting IS/IT Project Success Through Communicative Action

The paper presents research findings on two ERP IS/IT projects. It talks about working with risk management as a constructive instrumental view of communicative action and this being treated by stakeholders as contributing to project success (i) A project plan is an instrumental action plan that coordinates the actions by aiming at a preset goal (ii) Communicative action is the action of an individual actor to create a common understanding of the situation and seek collaboration with other actors (iii) Risk management practices stimulate action and participation of stakeholders (iv) Risk management actions drive the dynamics for the project success
Reference No. 8 : Hongliang Zhang (2011). Two Schools of Risk Analysis: A Review of Past Research on Project Risk
Risk Research which falls into two areas (i) Objective fact (ii) Subjective construction. Object Risk category of Project Managers prefer- Probabilistic Risk Analysis and Scientific Methods. Subjective Risk category of Project Managers prefer -Perceptions based and can vary with person-to-person. Group of studies on Project Risks have been conducted using data analysis methods of (i) Ontology: Is risks objective or subjective ? (ii) Epistemology: How are risks understood? other than probability? (iii) Analytic: Risk Analysis activities - technical or general? (iv)Evaluation: Evaluation Criteria other than expected value (v) Rationality: Risk Rationality? (vi)Communication: one-way or two-way communication? The paper Points out limitations with Subjective Risk categorization. Touches how wrong risk perceptions can affect time, cost and performance to the project.

SYNTHESIS

This paper is structured to outline the applied experience per process group with the underneath details for each process. The applied process details pertain to the Information Technology migration projects executed during 2006-2009 with more than 8000 PD (Person Days per Project) overall effort. Unless otherwise specified the process detail is applicable to both the projects being termed in this article as Project-A (executed for an Entertainment and cable Network Company) and Project-B (executed for a Bio-Medical Research Labs Company).

Applied Initiating Group Processes

Develop Project Charter

For Project A, Sponsor issued Charter with Client's high level needs of (i) Time to Deploy of New System (ii) Phased outage of existing system (iii) Target Application Scalability needs, Type Of Users/Performance. PMO authorized Project Manager with details of Planned Start: **1-Nov-2006**, Planned End: **1-Nov-2008**, Very Rough Order Effort Estimate: **160 Person Months** (i.e. Apprx. 3520 Person Days), Schedule Variance: **+/- 10%**, Effort Variance: **+/- 20%**, and Customer Satisfaction Index: **>= 3.5 / 5.0**

For Project B, Sponsor Worked with Customer to Finalize Statement of Work as per his objectives and needs. Sponsor Issued Charter with Allowable timeline, high level cost, cost incentives, and authorized Project Manager. Planned Start: **17-Jun-2008**, Planned End**: 2-Sep-2009** (UAT Completion), **3-Nov-2009** (Post Production), Very Rough Order Effort Estimate: **7000 Person Days**, Schedule Variance: **+/- 10%**, Effort Variance: **+/- 10%** and Customer Satisfaction Index**: >= 3.5 / 5.0**

Identify Stakeholders

For Project A, Project Management Team Compiled Stakeholder list through interactions with Client Project Manager and PMO of Execution Organization. Client Organization is a Strong Matrix Organization. Level of Participation and Importance of stake holders can be seen from the below graph of Figure.1 plotted vis-a-vis project progress from initiation to closure horizontally from left to right.

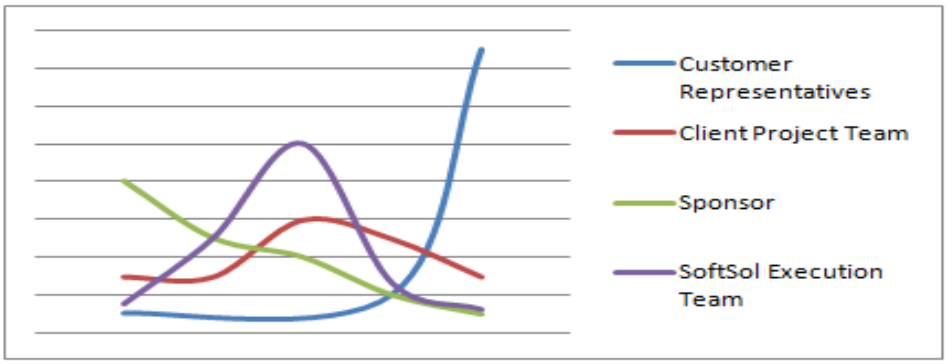

Figure.1 Involvement of Stake Holder for Project A

For Project B, Stakeholders have been identified along with levels of importance and accountability from Sponsor, Customer, End Users of Functional Divisions, Project Execution Teams, and Stakeholder list from earlier projects. Client Organization is essentially Functional Organization with small permanent and influential Project Team to manage Information Technology Operations.

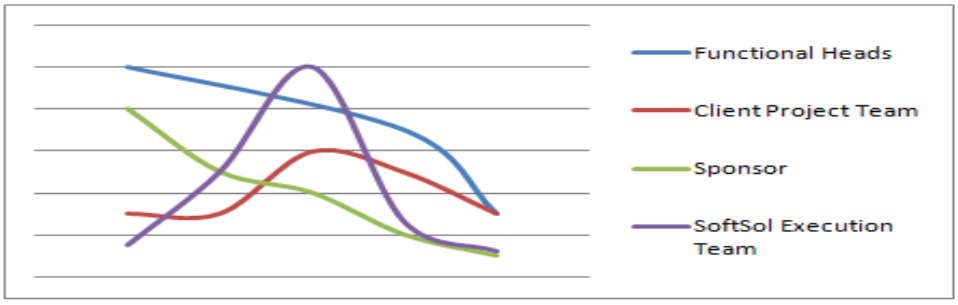

Figure.2 Involvement of Stake Holder for Project B

Applied Planning Group Processes

Develop Project Management Plan

For Project A, Customer Specified Process Performance Needs. Customer involved Processes were (i) Scope Management (ii) Integration Management (iii) Procurement Management and Customer reviewed Processes were (i) Time Management (ii) Cost Management (iii) Risk Management (iv) Communication Management (v) Quality Management. Pure Execution Organization Process was Human Resource Management.

For Project B, Process Tailoring was done from Standard Processes. Customer involved Processes (i) Scope Management (ii) Integration Management (iii) Procurement Management (iv) Time Management. Customer reviewed Processes were (i) Communication Management (ii) Quality Management. Pure Execution Organization Processes were (i) Risk Management (ii) Human Resource Management (iii) Cost Management.

Both Projects were to be executed in phases for development and delivered sequentially. The interim deliverables will be merged using system integration for final integration and user acceptance testing. The following diagram of Figure.3 depicts the project lifecycle.

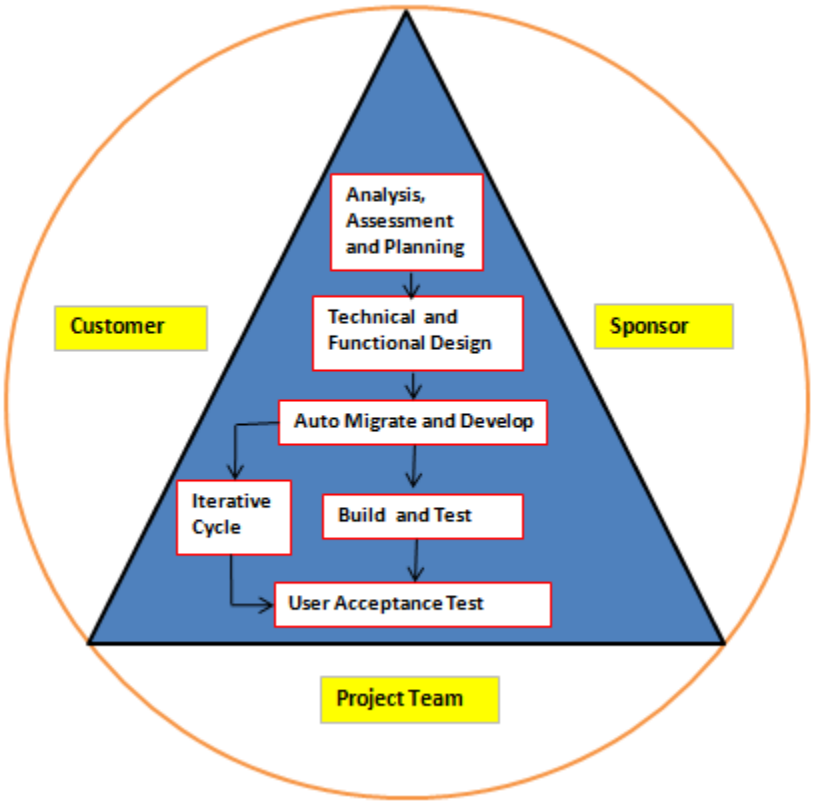

Figure.3 Project Life Cycle

Collect Requirements

For Project A, Collection and Formulation of requirements both functional and non-functional through (i) Prototyping a sample module with final deliverable configuration (ii) Replication of Client's Existing System Environment (iii) Documentation on Existing System (iv) Review and Approval by Client of Functional Document (v) Functional Assessment (vi) Establishment of Requirements Traceability matrix for Progressive Elaboration

For Project B, Collection and Formulation of requirements through (i) Interviews with Client's Functional Divisions (ii) Questionnaire (iii) Live Webinars on operations of Pre-Migration Systems (iv) Establishment of Requirements Traceability matrix for Progressive Elaboration.

The Projects were dependent on client providing their legacy system code, environment, operational schema, and sample data. It was client responsibility to acquire licenses for establishing environment at Project Location prior to the support was stopped by the vendor.

The excerpt of traceability matrix established and developed is as shown in the following diagram.

Table.1 Traceability Matrix

References to Proposal /SOW/ Application module/ Product / User Requirements				Design	Coding and Unit Testing		Functional Testing	UAT	Requirements
S.No	Requirement No / Ref No	Requirement Section/Use Case	Description of the Requirements	Architecture Assessment document	Mapped to Module / Unit / program Names	Mapped Unit Test Cases	Functional test case reference number	Mapped UAT Test Cases	Impacted Requirements (Other dependent requirements Or modules that get impacted)
1	Functional Assessment Document	Section 1.1.1	Detail for Requirement - 1	Architecture Assessment document reference -	Mapped Module - 1	Unit Test Case -1	Functional Test Case Number-1	UAT Test Case Number-1	Module - n1
2	Functional Assessment Document	Section 1.1.2	Detail for Requirement - 2	Architecture Assessment document reference -	Mapped Module - 2	Unit Test Case -2	Functional Test Case Number-2	UAT Test Case Number-2	Module - n2
n	Functional Assessment Document	Section 1.1.n	Detail for Requirement - n	Architecture Assessment document reference -	Mapped Module - n	Unit Test Case -n	Functional Test Case Number-n	UAT Test Case Number-n	Module - n1, n3

Define Scope

For Project A, Scope is ascertained through (i) Technological Alternatives Evaluation for Target Platform (ii) Product Requirements such as Look & Feel, Side-by-side Testing of Migrated Application, Performance, Concurrency, and Batch Processes (iii) Detailed Scope statement

established by including Software requirements Specifications (iv) Establish acceptance criteria by way of test case pass requirements.

For Project B, Scope is ascertained through (i) Look and Feel of Target Application (ii) Required Test Cases Passing Rate above 99% (iii) Performance in Specified Duration (iv) Client given Technological Choice and Framework (v) Detailed Scope statement established by including Software requirements Specifications (vi) Establish acceptance criteria by way of test case pass requirements.

The migration projects are dependent on target platform technology choices which are supported by conversion framework. A sample matrix for "Decision Analysis and Resolution" executed through Delphi method has been shown in the following table. Experts provide their rating anonymously for the Criteria as applicable for decision choice being made:

Table.2 Criteria Rating Matrix

Criteria	Expert -1	Expert -2	Expert-3	Expert-4	Expert-5	Total	Average	Normalized Weight
Criteria - 1	12	5	12	12	8	49	9.80	0.11
Criteria - 2	8	9	10	9	7	43	8.60	0.09
Criteria - 3	5	3	5	11	9	33	6.60	0.07
..	10	10	9	8	11	48	9.60	0.11
..	11	12	8	13	6	50	10.00	0.11
..	9	2	13	10	13	47	9.40	0.10
..	4	8	6	7	12	37	7.40	0.08
..	13	11	7	1	1	33	6.60	0.07
..	7	7	3	6	3	26	5.20	0.06
..	6	13	11	5	2	37	7.40	0.08
..	3	6	4	4	10	27	5.40	0.06
..	2	1	2	2	5	12	2.40	0.03
Criteria - N	1	4	1	3	4	13	2.60	0.03

Each expert would independently rate a target technology for the below criteria. The product of Normalized weight and a predefined score will determine the overall score of the chosen technology choice being made.

Scope definition is completed through agreement on (i) Deliverables and timeline for deliverables (ii) Time period for interim and final defect resolution before User Acceptance Testing (iii) Acceptance Criteria consisting of architecture, framework and performance requirements.

Create WBS

WBS has been established through (i) Deliverable Listing (ii) Functional decomposition Per Module viz., UI (User Interface), Business services, Establish Scope Baseline

Define Activities
Activities have been established through the given information of (i) Phases (ii) Milestones (iii) Activities Per Phase (iv) Leads and Lags Determination (v) Recurring Tasks.

Sequence Activities
Sequencing of activities is done by establishing (i) Logical Model of Project through viz., List of Activities, Client/Customer Preferences, Dependencies, Critical Path. Sequencing also accounted for Activities of Software licensing in case of Project-A where-as for Project-B, client dependent activities were included such as third party equipment interface verifications. Logical Sequence(s) in which the implementation can be carried out is planned. This planning allows for identifying modules per each deliverable milestone.

Estimate Activity Resources
Resource needs have been identified and mapped using (i) Availability Analysis of Human Resources (ii) Choice for high level Ramp-up and Ramp-down Plan (iii) Software/hardware Needs (iv) A matrix of resources with resource types is established

Estimate Activity Durations
Activity Duration Estimates with allocated resources is developed as a range of specified limits. The Implementation efforts are established through high, medium, complex ranking of User Interfaces as this is the area where maximum customization will be performed.

Develop Schedule
Baseline Schedule has been developed through (i)Schedule Compression (ii) Microsoft Project Plan Creation (iii)Establish Schedule Baseline

Estimate Costs
For Project-A, Cost Performance Baseline has been established through (i) Detailed Activity Level Bottom-Up Estimates (ii) Project Cost Estimation with Resource Type Costs (iii) Alternative Path costs for possible deviations (iv) Final choice to execute Project with a pool of highly talented formally trained graduates guided by a very few senior team member with a re-estimation of project to be 500 Person Months without significant deviation to project costs as against other alternative of operating with a small set of only senior resources.

For Project-B, Cost Performance Baseline has been established through (i) Project Cost Estimation together with contingency Resource Costs (ii) Shadow Resources for partial schedule crashing

Determine Budget

Baseline Schedule has been developed through (i) Time Phased Budget Requirements outline.

Plan Quality

For Project-A, Quality Planning is done through use of (i) Coding Standards given by Client (ii) Allocation of Quality Assurance Team (iii) Quality Audit Planning (iv) Tailoring Project Metrics Tolerances from Organizational Performance Capabilities i.e. Project Planned Parameters defined viz., Limits for Scope Variance, Limits for Schedule Variance, Limits for Cost Variance, and Defect Tolerance Density.

For Project-B, Quality Planning is done through use of (i) Coding Standards reviewed and approved by Client (ii) Approval by Client and Possible redesign by Client technical Teams for a few specific and special needs. (iii) Allocation of Quality Assurance Team (iv) Quality Audit Planning (v) Tailoring Project Metrics Tolerances from Organizational Performance Capabilities i.e. Project Planned Parameters defined viz., Limits for Scope Variance, Limits for Schedule Variance, Limits for Cost Variance, and Defect Tolerance Density.

Develop Human Resource Plan

For Project-A, Human Resource Plan has been established through setting up (i)Project Induction/Training Programs (ii) Environment and Ambience for Project Teams (iii) Ground Rules (iv) Client Review and Approval Responsibilities (v) Project Teams Responsibilities (vi) Career Path Definition (vii) Team Roles and responsibility assignments for Project Management, Product Development, and Product Verification and Validation

For Project-B, Human Resource Plan has been established through setting up (i) Project Induction/Training Programs (ii) Environment and Ambience for Project Teams (iii) Ground Rules for Human Excellence (iv) Client Review and Approval Responsibilities (v) Project Teams Responsibilities

Plan Communications

For Project-A, Establish communication planning through (i) Formal, Informal Communication Method Scoping and use of: Email, Phone, VOIP, and Video Conferences (ii) Weekly reports

and meetings (iii) Steering Committee meetings (iv)Weekly Client Meetings and tracking action Items and update Issue Log (v)Risk Monitoring and Control Meetings (vi) Proactive Defect Prevention Meetings (vii) Interim Product Verification Review (viii) Quality Assurance Audits and Meetings

For Project-B, Establish communication planning through (i) Formal, Informal Communication Method Scoping and use of: Email, Phone, VOIP, and Video Conferences. (ii) Involvement of Different Functional Heads at Different Times for Interim reviews and Feedback (iii) Weekly reports and meetings (iv) Steering Committee meetings (v) Weekly Client Meetings and tracking action Items and update Issue Log (vi) Risk Monitoring and Control Meetings (vii) Proactive Defect Prevention Meetings (viii)Interim Product Verification Review (ix) Quality Assurance Audits and Meetings.

Plan Risk Management

Risk Planning has been done through (i)Establish Risk activities (ii) Assign roles and responsibilities (iii) Allocate Resources.

Identify Risks

For Project-A, Risks have been identified through (i) Risk categorization viz., Process related, People and resource related (ii) Applicable Risk Listing from earlier available risk registers, watch lists and risk response history (iii) Project Risk register creation for risk tracking.

For Project-B, Risks have been identified through (i) Risk categorization viz., Process related, People and resource related, Economic and Environmental factors (ii) Applicable Risk Listing from earlier available risk registers, watch lists and, risk response history, third party interface related risks (iii) Project Risk register creation for risk tracking.

Perform Qualitative Risk Analysis

Risk register has been updated with assigned weight to establish Probability Impact Priority Number for all the risks.

Perform Quantitative Risk Analysis

Risk register has been updated with Numerical Rating of Risks based on project impact to project planned parameters viz., Scope Variance, Schedule Variance, Cost Variance, and Tolerance Density. Alternative staffing analysis for achieving deliverables and with given cost factors has been developed.

Plan Risk Responses

Risk Response Planning has been established for incident risks through setting up of Risk Response Planning, Contingency Planning, Mitigation Planning, and Watch List for low priority risks having no impact on deliverable acceptance. Assumptions about the Migration Tool re-evaluated with respect to the Specific Client Application. Detection of Parameters affecting the Scope either directly or in-directly performed. Classification of deviations from stand-point of impact on the project as High, Medium, Low was done. Specific root cause evaluation for Process Improvements was planned through-out to allow risk reprioritization. Risk planning done for issues such as (i) Issues with Integrating as part of Global Virtual Team (ii) India and US Time Zones were more than 10 hours apart (iii) Meetings need to be scheduled well in advance (iv) Team Communication Abilities had to be aligned and tuned (v) Communication Channels have to be defined between specific offshore resource to corresponding client point of contact (vi) Client's Visit to Offshore facility for process review (vii) Taking advantage of process for ample scope and Opportunity to obtain instance feedback from customer on several project crucial issues (viii) Remedial actions on low customer satisfaction areas for eliminating potential problems (ix) Specific attention to Improve customer interfacing processes which were riskier areas.

Plan Procurements

For Projects- A, Procurement Planning has been established with in Project team with involvement of PMO for (i) Revisit Effective planning for client delight in Fixed Bid Projects (ii) Work with Customer for software licenses through business case.

For Projects- B, Procurement Planning has been established with in Project team with involvement of PMO for (i) Revisit Effective planning for client delight in Fixed Bid Projects (ii) Work with Customer for Change request approvals through Quantifiable impact analysis.

Applied Executing Group Processes

Direct and Manage Project Execution

Directing and Management of Project Execution is done through (i) Establishing an Internet Work Management System tool to handle Task/Work Allocation, Resource Progress, Task Status, and Project Task Level Effort tracking.

A NetOffice Open Source Internet tool has been employed to create detailed level project tasks, work delegation for each milestone with in MPP specified schedules.

Perform Quality Assurance

Perform Quality Assurance is performed through (i) Execution of Quality Audits by Quality Assurance Team (ii) Non Compliance Identification (iii) Suggestion of Corrective and

Preventive actions (iv) Verifying the implemented Corrective and Preventive actions (v) Verification of Monthly Metrics (vi) Verification of Documentation (vii) Verification of Deliverable status (viii) Verifying Client Satisfaction Reports

Quality Assurance activities are carried out as per Quality Assurance plan to ensure that (i) stated project planning is being adhered without deviations (ii) Verification and Validation procedures are being followed (iii) Project Planned Parameters such as Schedule Variance, Cost Variance, Defect Resolution are with-in control limits.

Acquire Project Team

Project team is set up through (i) Induction of Resources into Project (ii) Allocating Resources (iii) Setting Project Goals (iv) Educating on Overall project Goal

Develop Project Team

Project team development is achieved through (i) Acquaintance with Tool Driven semi automated migration framework (ii) Training to fill Target Platform skill gaps (iii) Working for Team's Professional development (iv)Striving for Value Added Services with no gold plating. Specific to Project-B, training on domain specific knowledge has been provided.

Manage Project Team

Project Management is performed through (i) Periodic One-on-One meetings with Teams for Performance review and improvements recommendations (ii) Formal Performance Assessments (iii) Professional advancements (iv) Team building activities. In addition, specific to Project-A, effecting Hygiene and Motivation Factors, and specific to Project-B, Guiding and Coaching in Areas needing improvement through assigned mentors were carried out.

Distribute Information

Information Distribution is done through (i) Client Related Status Distribution viz., Weekly Status Reports Distribution, Weekly task planning information, Specific Issues Email Exchanges, Milestone Specific Communications, (ii) Non-Client Related Status Distribution viz., Weekly Status Reports Distribution, Weekly task planning information, Specific Issues Email Exchanges, Milestone Specific Communications, Fortnightly Status Reports, Monthly Sponsor briefing meeting, Change Control status distribution, and Risk status Reporting.

Manage Stakeholder Expectations

Stakeholder management is performed through (i) Execution of Stakeholder strategy Planning (ii) Effective Use of Issues Log (iii) Exercise of Professional Attire and Ambience.

Conduct Procurements

The responsibilities executed include (i) Participate in Bid Analysis (ii) Respond with Response to Request for Proposal (iii) Provide Preferential Advantage through Tool Based Migration

Applied Monitoring & Control Group Processes

Monitor and Control Project Work

The process was executed through (i) Measure the project execution against plan (ii) Determine applicability of Changes (iii) Raise Change Requests for Non-impacting changes on project baseline. Specific for project A, that Change Requests required Customer Approval for Effort Impact, however control changes as change requests are not chargeable to customer. Specific to project B, it required Involving Change Control Board/Steering committee for Client Chargeable Change Requests.

The project work was evaluated based on the test verification and validation of the implementation. The summary details tracked through a defect tracking system are as captured in the following table.

Table.3 Defect Tracking Data Sheet

Defect Id	Test Case Id	Test Type	Module/ Sub System	Defect Description	Date of Report	Severity	Priority	Status	Defect Type	Defect type for Analysis Purpose	Defect Cause	Phase Injected	Assigned To	Fixed By	Fixed Date	Verified By	Verified Date	Remarks /Action taken
1																		
2																		
n																		

Manual Test Case details are as given in the following worksheet (from Project-A data).

Table.4 Test Case Data Sheet

	Total No of GUI Test cases		Total No of Functional Test cases	
Milestone	Cross Section of Test cases	Mean Steps Per Test Case	Cross Section of Test cases	Mean Steps Per Test Case
M2	119	9.966	67	23.254
M3	120	10.367	66	12.879
M4	40	12.950	26	24.115

Performance comparison for Key Customer Provided data is recorded using the following data sheet.

Table.5 Performance Test Result Data Sheet

S.No.	Screen	Screen/Component	Test method	Risk Level	Owner/Status	Performance Status– Legacy (seconds)	Performance Status-New Platform (seconds)	Bug Tracking System ID	Release Number	Test Data	Issue Type Client /Server
1	Screen-1										
		Component-1		1	Developer-1	1	1		4.7.0.B	OACB2000	
		Component-2		4	Developer-n	<5	<10	21045	4.7.0.B	CCDB4567	Server
		Component-n		1	Developer-1	2	2		4.7.0.B	XAPB9987	
..	...	...	...	...	...	...	...	...	...	...	...
n	Screen-n										
	...	...	...	...	...	...	...	...	...	...	...

Perform Integrated Change Control

The change integration control was performed through (i) Status Update of Change Requests through - Verify Change requests, Updating Change requests, Approving Change request (ii) Integrity Verification for Preventive and Corrective Actions

Verify Scope

The process involved (i) Deliverable Inspection (ii) Corrective Actions for Deviations (iii) Adherence to acceptance criteria (iv) Deliverable Compliance (v) Formalizing Acceptance of Deliverables (vi) Customer Sign Off

Control Scope

The process involved (i) Root Cause Analysis (ii) Weekly Status Review (iii) Monthly Metrics Review (iv) Planned versus Actual Variance Analysis (v) Earned Value Techniques

Control Schedule

Schedule control is done through consolidated monthly metrics collection and analysis from weekly collected data.

Control Costs

Cost control is done through consolidated monthly metrics collection and analysis from weekly collected data.

Some quantitative information for the projects being studied is given in the following diagrams.

For Project-A, Performance Measurement Metrics can be noted from the following table

Table.6 Schedule and Cost Performance Index Data for Project-A

Month	Milestone	CPI	SPI
Feb-2007	M1	1.111	0.977
Aug-2007	M2	0.902	1.000
Nov-2007	M3	0.855	0.902
Jan-2008	M4	0.834	0.955
Apr-2008	M5	0.758	0.909
May-2008	M6	0.884	0.979
Jun-2008	M7	0.905	1.000

For Project-A, S-Curve is as shown in the following diagram

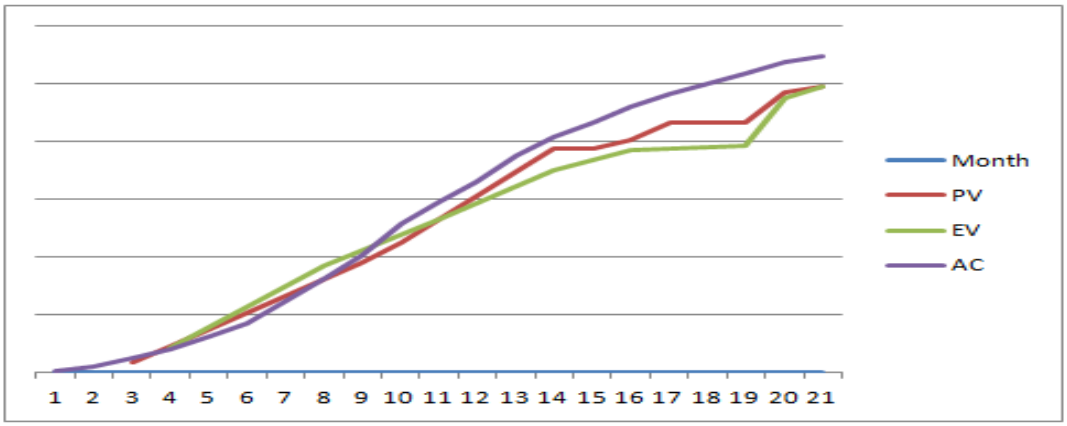

Figure.4 S-Curve for Project-A

For Project-B, Performance Measurement Metrics can be noted from the following table

Table.7 Schedule and Cost Performance Index Data for Project-B

Month	Milestone	CPI	SPI
Sep-2008	Phase-1 (Analysis)	0.842	0.779
Dec-2008	Phase-2 Bld-1	0.995	0.971
Jan-2009	Phase-2 Bld-2	0.934	1.000
Apr-2009	Phase-2 Bld-4	0.852	0.963
May-2009	Phase-2 Bld-6	0.867	0.996
June-2009	Phase-2 Bld Patch	0.915	1.000
Nov-2009	Phase-3 (UAT)	0.848	1.000

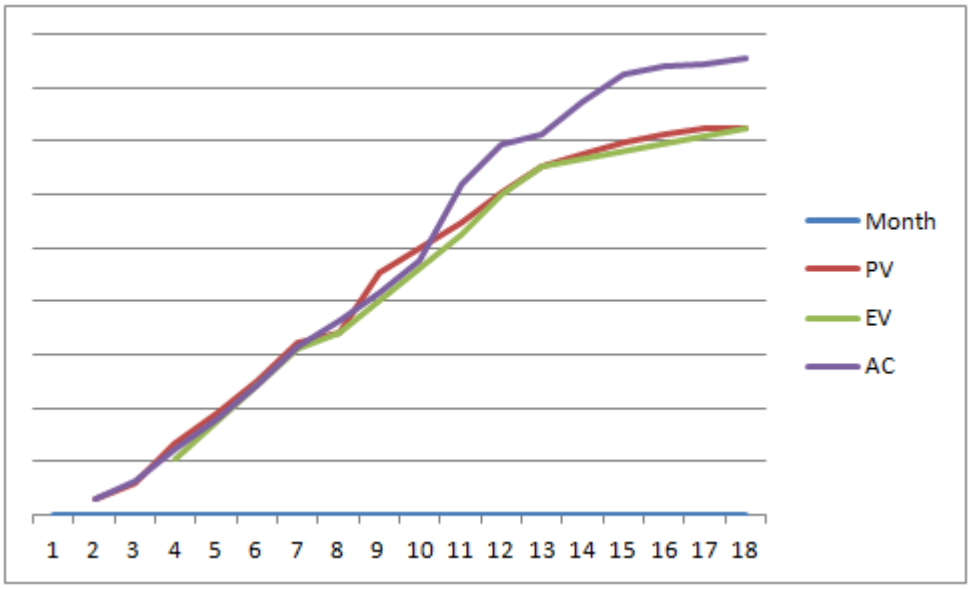

Figure.5 S-Curve for Project-B

The Earned Value performance can be seen using the S-Curve shown in the above diagram. Cost has steeply increased than originally planned due to employed crashing to avoid risk of resource attrition. The crashing did not change the schedule however, as the customer approval dates remained the same for milestone acceptance as per original schedule baseline. A non customer impacting development schedule followed is as shown below:

Table.8 Regular versus Crashed Schedule for Project-B

Phase	SOW Schedule		Planned Schedule		Crashed Schedule	
	Start	End	Start	End	Start	End
Phase-1 (M1 to M5)	2-Jun-08	29-Aug-08	16-Jun-08	12-Sep-08	16-Jun-08	12-Sep-08
Phase-2 (M6)	30-Aug-08	30-Mar-09	13-Sep-08	13-Apr-09	13-Sep-08	13-Mar-09
Phase-2 (M7 and M8)	1-Apr-09	2-Jun-09	14-Apr-09	16-Jun-09	14-Mar-09	16-May-09
Phase-3 (M9)	3-Jun-09	2-Sep-09	17-Jun-09	16-Sep-09	17-May-09	16-Aug-09
Phase-4	3-Sep-09	3-Nov-09	17-Sep-09	11-Nov-09	17-Aug-09	11-Oct-09

For Project-B, module wise Cost and Schedule Performance Index can be seen from the below diagram.

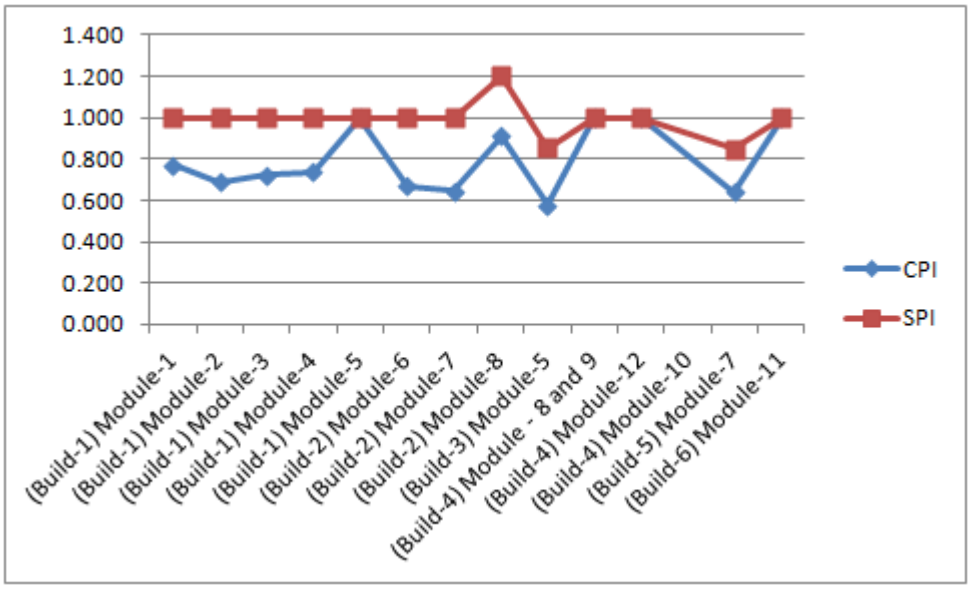

Figure. 6 Project Performance Index for Project-B

Perform Quality Control

For Project A, Quality Control is performed through (i) Statistical Sampling for Re-verification of Control measures (ii) Biased Random Sampling for picking and verifying most complex correction/preventive actions (iii) Ranked grouping of defects and common treatment for bulk defect correction.

For Project B, Quality Control is performed through (i) Test Case Execution and Coverage (ii) Verification (iii) Validation (iv) Regression Testing (v) Automated and Sanity Testing

For Project –A, Pareto Analysis and Defect Classification right after tool translation, after Milestione-1 is as shown in the following diagram.

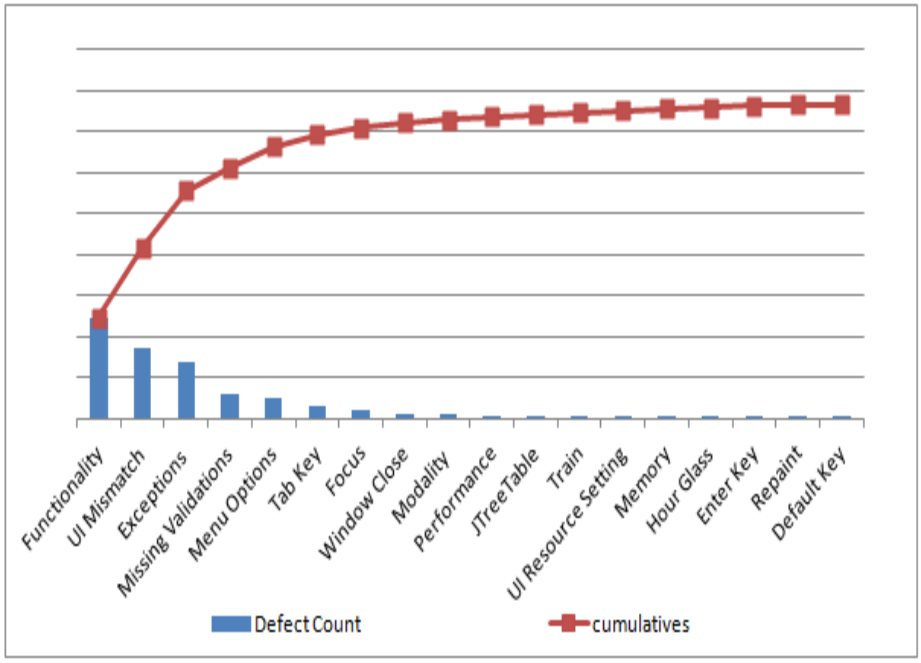

Figure. 7 Pareto Graph for Project-A

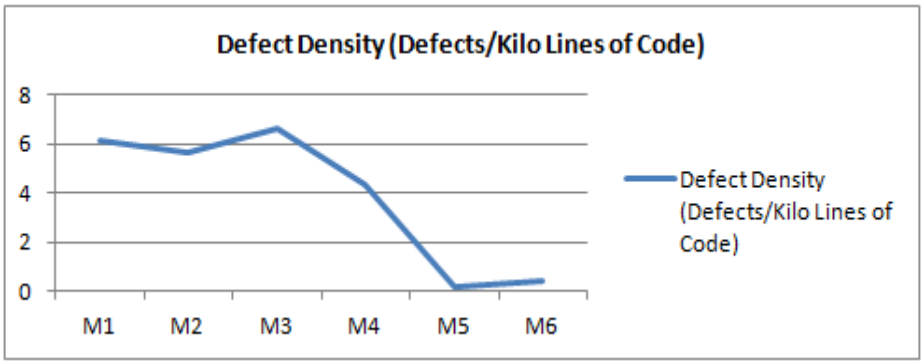

Figure. 8 Milestone wise Defect Density Pattern Project-A

For Project-A, the above diagram shows the defect resolution. The sharp slope between M3 and M5 in the above diagram shows how the Type-I defect fixes between M2 and M3 have a leveraging improvement on the project.

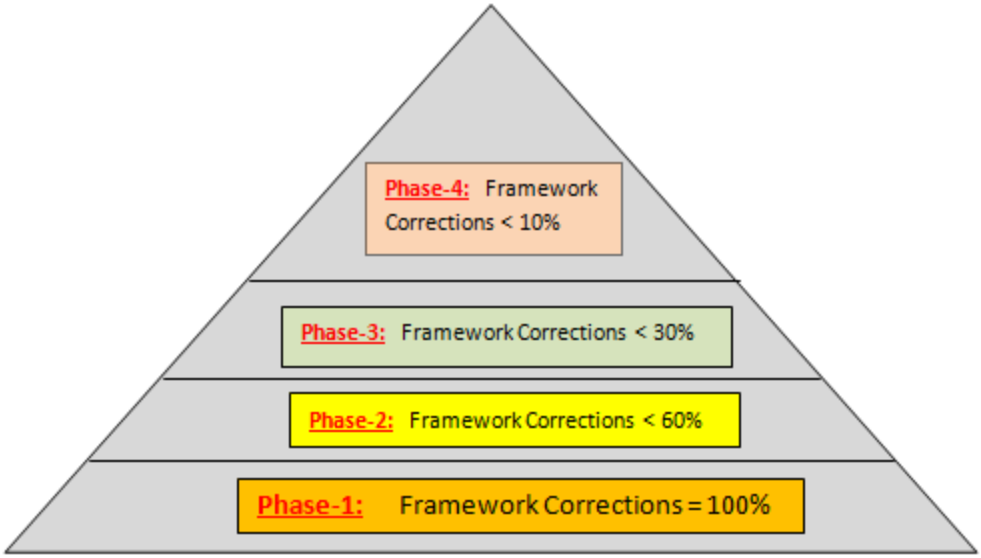

Figure. 9 Phase wise Defect Resolution for Project-A

For Project-A, the defect Resolution experience can be better understood from above diagram. For Project-A, the following diagram is showing causal analysis performed through 'Fishbone Analysis" for a milestone, M5 schedule slip.

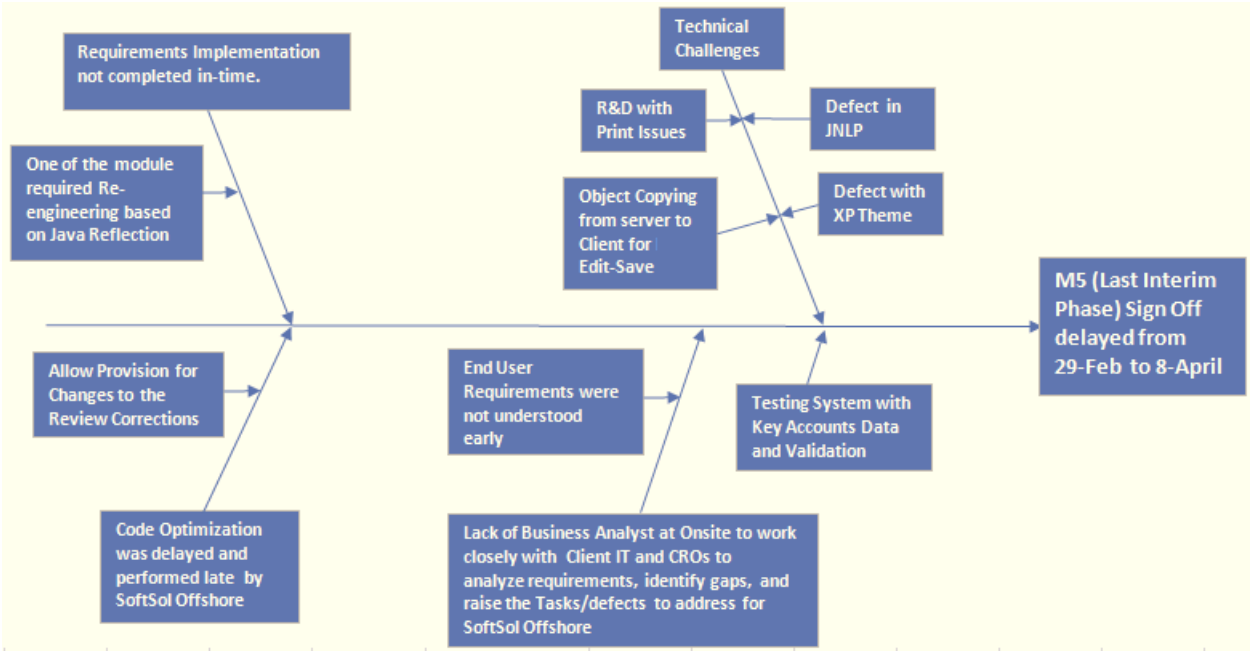

Figure. 10 Root Cause Analysis for Project-A Milestone Delays

For Project-B, Pareto Analysis and Defect Classification right after tool translation is as given in the following diagram.

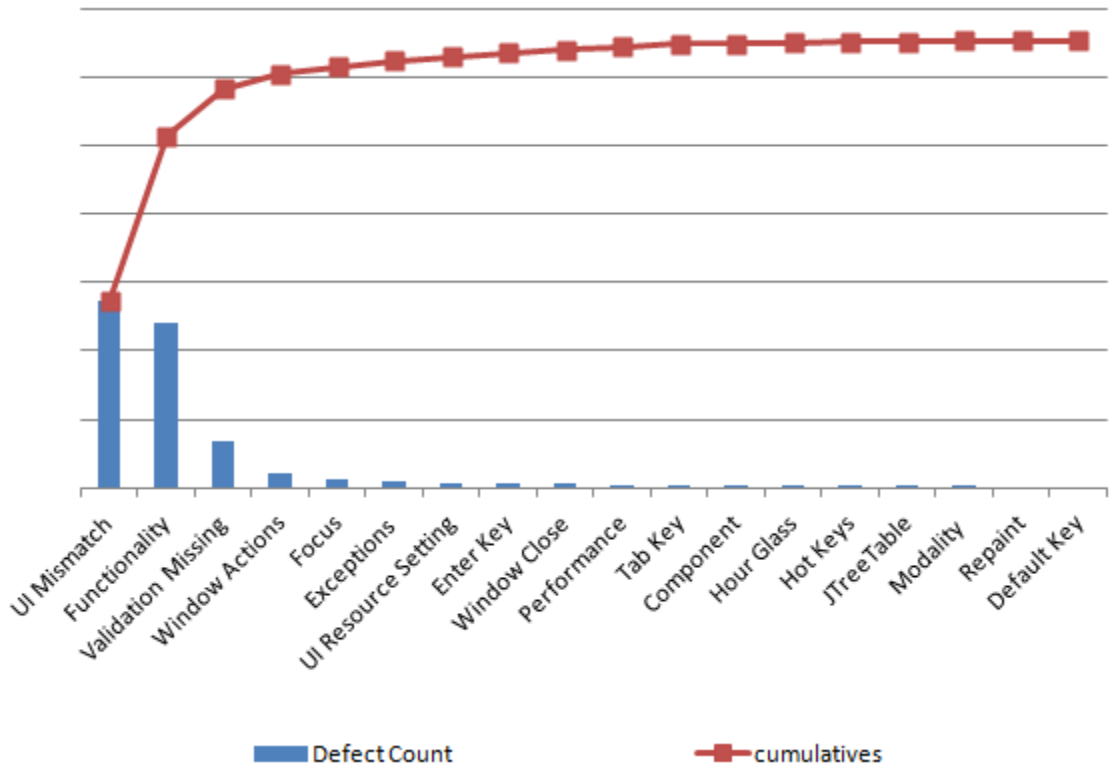

Figure. 11 Pareto Analysis for Project-B

For Project-B, the below diagram is showing all the defects resolved and as a result of dropping in net defect rate. The defects logged by Quality Assurance team and Client IT team are separately shown.

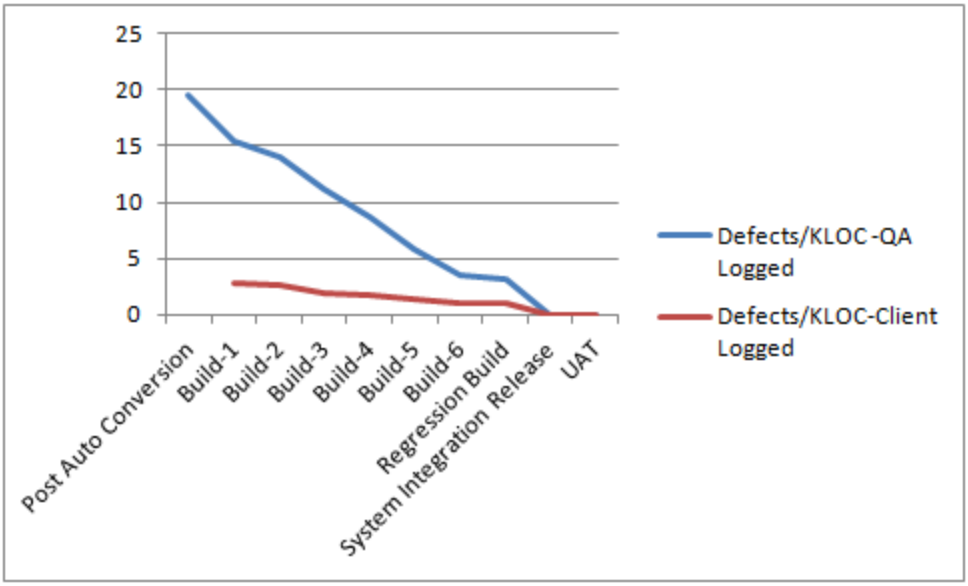

Figure. 12 Milestone wise defect density for Project-B

The sharp dropping slope in QA(Quality Assurance) Team finding defects is attributed due to (i) customer logged defects helping in fixes which are globally applicable for all modules (ii) common fixes at framework level have application wide impact.

Report Performance
Performance is reported through (i) Emails of Status Exchange Weekly (ii) Code Drops (iii) Demos through WebEx (iv) PowerPoint Presentations Fortnightly (vi) Customer satisfaction survey requests

Monitor and Control Risks
The process involved (i) Periodic Review of Risks (ii) Risk Reassessment (iii) Risk Audits (iv) Risk Tracker Updates

Administer Procurements
The process involved (i) Integrating Project Execution, interim and final delivery as per Customer Procurement Model (ii) Ensure acceptability through constant reviews of Customer

Applied Closing Process Group
Close Project or Phase
The process included (i) Examine that Acceptance Criteria have been met (ii) Sign Offs Received for Deliverables (iii) Lessons Learned Compiled

Close Procurements
The process included (i) Examine that Acceptance Criteria have been met (ii) Sign Offs Received (iii) Contract Close Agreed (iv) All Project Documents Archived (v) Final Lessons Learned Compiled

Take Away from Conducted Lessons Learnt in the projects respectively is:

Project A
• Specific Recommendations for improving Migration tool efficiency • Scope for enhancing Coding Standards • Tighter checklists for less defects seeping through to QA team • Specific communication improvements for effective process efficacy • Need for adopting Client specific technical terminology rapidly and standardization for project • Security Standards beef-up through Security certifications • Need for a small execution team presence at client location always throughout the project. • Exposure to Several High End Open-Source Tools for examining and achieving Quality Deliverables • Team must anticipate technological challenges such as performance and Memory issues and have solution for the same. • Focused Business and Domain Analyst all through the project is mandatory to alleviate pains of leads. • Project Management must strive hard to be Pro-active instead of being responsive to fire fighting issues. • Recording Client Interactions for replay, mainly in case of Knowledge Transfer Sessions are most valuable and essential as this helps the newly inducted teams to catch-up with Project fast. • Team Building activities are essential when executing long term projects for gaining team spirit. • To avoid any potential unforeseeable risks, seniors must be kept on contingency availability on project for minimum as long as for the needed duration • Timing of testing tasks should be re-prioritized time to time to handle risks such as access permissions to Client Systems/Environment are delayed for conducting Client environment specific tests. Also dependency should be brought to the possible lowest. • Automated Testing Tool, if planned to use should be pressed in early for reducing Sanity Test Cycle. • Some crucial issues were escalated to client, which were then actually resolved by offshore team themselves. Escalation needs subject to reservations must be understood.
Project B
• Multiple Versions of functional documents with subtle differences. • Functional Assessment acceptance by client was tough; it had been rewritten totally by client due to sensitive domain details such as specific information, depth of content, continuity of flow, and presentation of content. • Client insisted on tailored and specific details to be maintained in all project plans and documents Client's quality requirements forced documents to be specific and less verbose and content centric, while maintaining implementation specific details outside. • Could successfully work with tools of NetMeetings and replayable WebEx sessions through which Client delivered Knowledge Transfer sessions.

- Effective Requirements gathering was performed through client answering to questionnaires, interviews with functional/domain heads.
- KT Sessions were well organized to compile the project scope Client agreement could be obtained through Prototype development, technological choices could be selected from available alternatives.
- Network Connectivity to client environment took some time.
- Communication: Intimating client that during dev phases there can be defects was very important. There were only 18 defects that had to be resolved during UAT after having resolved all defects prior to UAT.
- Defect Tracking Web Application (BugZilla) was Customized by customer as per his preferences and desires.
- Project had to readjust as per delays in delivering Test Cases by Client.
- Code merging from client IT team fixes and build-release management.

IMPLICATIONS

Although this list is not exhaustive, the auto conversion tool based IT migration project success story opens the following options:

- Less-hassles to end users and customers/clients.
    - The clients need not work with Project teams on a full cycle requirements elicitation process.
    - Requirements phase includes understanding the system from User Workflow point of view i.e. scenarios and use cases.
    - Customer participation and delight is enriched through the involvement in interim and final phase deliveries.
    - The customer can use their legacy system to mirror their needs and IT teams can reflect the same in their target platforms for functionality needs.
- The Training to the technological teams is virtual and very effective.
- The presented information nullifies fears of quantifiably measure and control the migration project(s).

IT Ground-up development project costs could be higher, time consuming and riskier when compared with tool driven modernization where the costs, time can be greatly leveraged when a well tested process, such as stated here is applied. The process outlined recommends for a tailoring as per the need based on the information/data presented here. Some of the key observations and recommendations from this presentation are:

1. The data favors the processes be selected such that the development is carried out in phases with good logical separation of features which can provide a horizontal sample across all layers of the Software system. Best logical separation is achieved when

majority of the features are reflected in all phases, so that the solution advantages from the early phases are leveraged in the later phases in a pyramid model.

2. Test Validations be subjected mandatorily through application of key data which eliminates costly customer defects. Key data refers to the population of data which is most frequently used by the Software System.
3. Quality checklists be prepared to see that Customer Requirement specifications have been met during Implementation.
4. Need for periodic re-evaluation (phase-wise as done here) to explore potential opportunities for better positioning project planning and development.
5. Focus on the cross platform (source and target environment) differences during baseline of customer requirements.

CONCLUSIONS

This paper examined the project management process synthesis from two large Information Technology Software migration projects. All the project management processes of PMBOK have been put to use. Due to the complex nature of migration, project management processes needed careful application and varied as per project domain. It has been observed that leveraging processes efficiently can provide crucial benefits in the context of Triple constraints which could otherwise affect lean margins resulting in potential risks. Given the nature of projects, it was noted that the functional Scope is tightly determined in the very beginning and does not change until final delivery to customer, excepting customer change requests. However, Scope management is a challenge owing to the cross platform differences. The amount of scope variations is determined by the type of Software system being migrated, complexity, and functionality.

Yet the migration projects are different from conventional development projects, the former are part and parcel of Software upgrade domain space. They deliver valuable services in meeting customer scalable needs for latest and state-of-the-art technologies. For executing organization, they offer scope for meeting and exceeding the project applicable benchmarks. Every migration project can be unique in the value produced through enhanced efficiency in process application, carry forward information through elaborated Organizational Process Assets and Enterprise Environment Factors. The precedence preambles and eliminates migration fears to re-use the existing systems as input. Contribution to Human Resource development in technological skills area is enormous and the amount of feature coverage of target technology achieved in the limited space of duration outweighs limited loss of employee attritional risks, stressing natural advantages of choice for Project Organization.

The demonstrated experience presented empirical guidance which can work as expert judgment in process adaptability for project initiating, planning, execution, integration and closing phases. The information should help adherence to future migration projects largely and development projects as well to some limited extent. The information helps project management community and industry experts making right decisions on reducing project failures and gauging project economy factors viz., project Triple constraints (Scope, Time, Cost Variances). The article demonstrated what value can framework tailored with rich set of corrective actions and preventive actions will ensure course correction for avoiding deviations and triple constraint overruns.

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About the Author:

Siva Kumar Akkiraju

Author

Siva Kumar Akkiraju. M.S, has been with SoftSol as Program Manager in Hyderabad, India with SoftSol India Limited since 2006 until January 2012. He has more than 18 years of IT specific industry experience inclusive of more than 2 years in USA. He is settled in Hyderabad with his family (wife and two daughters). Siva did his bachelors in Electrical and Electronics Engineering from **Jawaharlal Nehru Technological University**. He did his MS in Electrical Engineering from **Texas A&M University** at College Station. Siva holds PMP®, SalesForce® Developer Certification and Teradata® RDBMS certifications. His interests are following IT and Program/Project Management trends. He can be reached at: siva.akkiraju@gmail.com and sivakumar_akkiraju@yahoo.co.in.